Vol. 19 September, 1954 No. 3

CASTANEA

The Journal of the Southern Appalachian Botanical Club

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PUBLISHED FOR THE CLUB
MARCH, JUNE, SEPTEMBER, DECEMBER
at
West Virginia University
Morgantown, W. Va.

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Notes and short scientific papers relating to the botany of the region are welcomed and will be published to the extent that the size of the Journal allows.

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CASTANEA

The Journal of the Southern Appalachian Botanical Club

Vol. 19 September, 1954 No. 3

Secondary Succession and Growth of Yellow Poplar on the "Green Mountain" Nicholas County, West Virginia

WILLIAM D. CREASY

The yellow poplar, *Liriodendron tulipifera* L., is one of the most important timber trees of eastern North America (1,7). In addition to its usefulness as a timber tree and soil builder, it will grow on eroded, and hence, "poor" soils if they are well drained (1), it has value as a shade tree (19, 22, 29), produces certain useful drugs in the root bark (22) and is a source of honey (15, 24). It is an important plant for the paper industry and is grown experimentally on other continents (13). This successful, primitive, woody angiosperm is widespread, growing naturally northward to Canada, southward to Florida, and as far west as Arkansas and Missouri (5, 13, 22). In addition to its widespread distribution it is one of the largest trees of the eastern North American deciduous forest. It attains a height of nearly 200 feet and a diameter of at least 12 feet.

The yellow poplar has incited the interest of numerous investigators. These include Guard and Whitaker on morphology of reproductive structures, and Paul and McCarthy on vegetative morphology. Studies physiological in nature have been made by McDermott, Kramer, Kozlanski, Paton, and Scarth (8, 11, 12, 13, 14, 16, 18, 23, 31). Many ecological papers have appeared in the literature from time to time, and recently the Agricultural Experiment Station of West Virginia has published a series of papers on the yellow poplar approaching the subject from an economic standpoint (9, 10, 27).

The yellow poplar attains its maximum growth, at least in the area of this study, in moist, well-drained soils of rich coves, where it is frequently seen today in dense, relatively pure, second stand growths (Fig. 1). This paper deals with one such cove from which the virgin

timber was removed during and between the years 1890 and 1893. It is an attempt to evaluate the conditions and events that have enabled the yellow poplar to dominate this site and with the hope of adding some fragment of information to the general store of knowledge concerning the ecology of this plant. After the virgin timber was removed, which was yellow poplar, black walnut, basswood, sugar maple, chestnut, some trees of the red oak grouping (species unknown), and other less conspicuous woody species, including black locust, dogwood, and sassafras, the land was cropped for a period of about ten years. Some of the smallest of the yellow poplar trees were used to build a tobacco barn and some of the best walnut trees were sawed into lumber on a local "up and down" water sawmill, but the majority of these trees were burned or rolled into a deep ravine where they were left to decay. Remnants of these logs were still to be found until comparatively recently and some that were girdled and left standing to fall much later decayed more slowly and may still be seen. This land was cleared for agricultural purposes, and the crops that were grown were chiefly tobacco and corn, but pumpkins and watermelons were grown as a second crop in with the corn. When the growing of the above mentioned crops was discontinued, grass was sown on the area and it was used for pasture until the woody plants became dominant by the process of secondary succession. This permits the oldest plants of the area to be (1953) fifty years old as stated by local tradition and as determined by annual ring counts (Fig. 2).

Description of the Area and Methods

The portion of the land with which the forest under discussion deals is a part of the "Green Mountain." This name was acquired as a result of the land having been owned by a man named Green at one time, and from whom one hundred acres were purchased for the price of one horse and twenty dollars. The name is applicable locally only and the mountain (hill) is scarcely significant from the many others of similar size and topography in the immediate vicinity except for the vegetation, which is predominantly yellow poplar on the portion covered by this study. It is located one mile west of State Highway 41 at a point midway between the villages of Calvin and Craigsville, Nicholas County, West Virginia. The portion covered by the forest is approximately six acres in extent. It lies at an elevation of from 2,315 feet to some one hundred feet higher at the highest point (20). It is adjacent to another portion of this mountain of similar size which was cleared at the same time but later (1929) had the second growth removed. Some observations were made of this

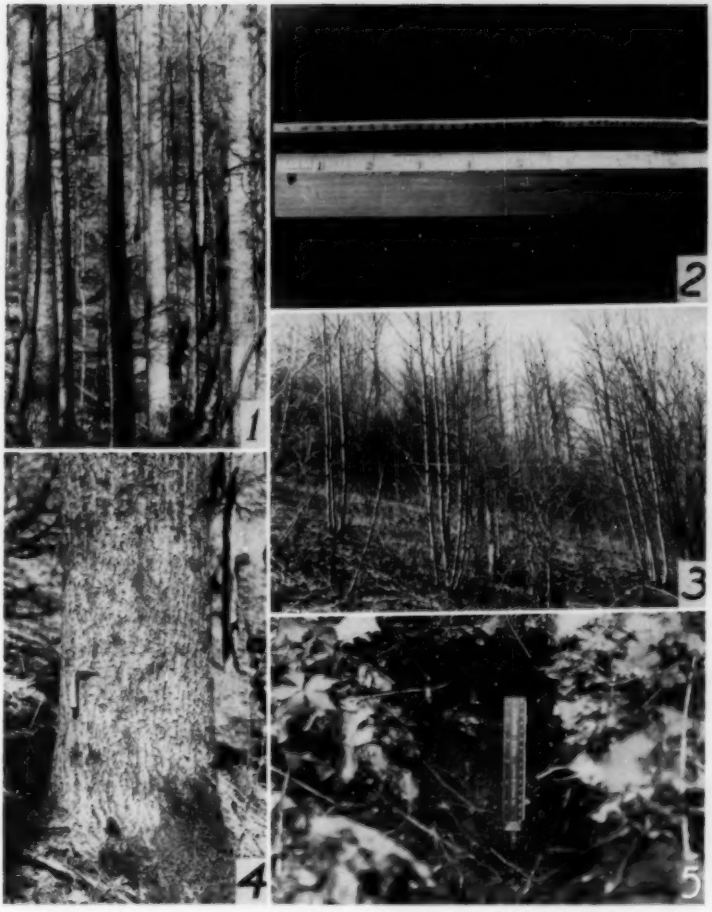

Figure 1—A view into the forest showing the predominance of the yellow poplar. Some of these trees are over 100 feet tall and they average 19.5 inches DBH.

Figure 2—An increment boring taken from one of the largest trees of the area.

Figure 3—General view of an adjacent area that is also covered with yellow poplar trees. Some of the largest of these trees are 17 years old.

Figure 4—Close up of one of the yellow poplar trees. The DBH of this tree is 22 inches.

Figure 5—Soil well showing the deep, dark, porous soil of the area.

area also. These plants are now as much as seventeen years old and they, too, are mostly yellow poplar (Fig. 3).

The precipitation in this region is in the neighborhood of fifty inches annually. Over a period of twenty years, 1921 to 1941, at Camden-on-Gauley, a town six miles northeast of this area, the annual precipitation averaged 49.77 inches (28). A considerable portion of the precipitation of this region is snow and it may cover the ground continuously for several weeks on the north slopes during late December, January, and early February. The soil of the area is fertile, porous, and very dark. The top soil averages about one foot in depth (Fig. 5). The lay of the land is toward the north, and although there is considerable variation in the slope at various points, the average angle is thirty degrees from the horizontal.

Data for this paper were collected by personal observation over a period of years, discussion with the oldest residents in the community, and by scientific procedure using cameras, levels, measuring tape, mattock and shovel, and an increment borer. Photographs were taken of the area, of the forest floor, of individual trees, and of soil profiles. Twenty-five of the largest trees were measured, DBH, and twenty-five of the trees of the most recently cleared area were measured, DBH, for future reference. The actual height of two fallen trees of the larger group were taken and the heights of five other standing trees were computed in the absence of better instruments. The two trees that were down were known to have been felled by the wind during the summer of 1952 since they still retained their leaves. These fallen trees were not as tall as those that were measured that were standing. This was because of the fact that they were growing closer to the crest of the ridge where there was more room, and hence, less natural pruning. These measurements of the standing trees were taken on uneven topography and are, therefore, subject to at least some error.

Results and Conclusions

As a result of this study the conclusion is reached that the yellow poplar is one of the most successful of all the woody species growing in this region where suitable soils are found. This appears to be particularly true in so far as propagation is concerned, despite the poor development of seeds of this species as found by Guard (7,8). On the ridge that surrounds the cove were mature trees of many species during the time that this area of land was being re-seeded and natural reforestation was going on, yet none of these species competed favorably with the yellow poplar in establishing itself. The second

most abundant tree of the plot is the black walnut, and even so, there is only about one black walnut to each twenty yellow poplars. The success of this stately "tulip tree" is due to a variety of factors, its ability to propagate itself vegetatively as well as by seeds, and its comparative freedom from disease. Its rapid growth enabling it to overcome competition with other plants (4, 13) has much to do with its success in the early stages. The amount this plant grows during one season is the result not only of the rapidity of growth but also of the length of the growing season during which the growing occurs (11). As a result of this long period of growth, which lasts until September, the amount of rainfall during the latter part of the growing season has particular significance. In the knowledge of this author few of the seeds of this plant are eaten by animals, a factor that may have much to do with the success of a plant. The availability of mature trees in the vicinity of a denuded area has much to do with the success of a given species found under the conditions of secondary succession. On an area very similar to the one being discussed and scarcely a mile away, there was formerly to be found an almost pure stand of second growth ash (this land has since been cleared of all woody plants). It is believed by the author that if there had been mature yellow poplar trees in the vicinity of the ash forest at the time re-seeding occurred, this forest would have been predominantly yellow poplar. This tends to emphasize the value of the accepted forester's practice of leaving seed trees at strategic points when timbering a region.

The yellow poplar is sensitive to the amount of moisture in the soil and requires a heavy rainfall during the growing season to insure maximum growth. This is true only if the soil is well drained as the tree is not found growing well on very heavy soils that hold an excess of water (1, 26). The width of the annual rings of borings taken from these trees could easily be correlated with the annual rainfall of the given years. Other things being equal the annual rings grew thicker in years of abundant rainfall during the growing season (Fig. 2). The average height of the five standing trees mentioned earlier was 102 feet. The height of one of the fallen trees was 78 feet and that of the other was 80 feet. The average diameter of the 25 trees that were measured, DBH, was 19.5 inches (Fig. 4). The largest one measured was 25.5 inches and the smallest was 15.2 inches in diameter. No particular effort was made to find the 25 largest trees of the area as this portion of the study was made but an attempt was made to find the largest tree which exists on the plot; this is believed to be the one mentioned above.

Because of its rapid growth, ability to grow on relatively poor soils, and its many uses before and at maturity, the yellow poplar appears to be an ideal tree for reforestation in certain areas of Nicholas County, West Virginia. The precipitation in the area is high, approximately 50 inches annually, and most of the soils are well drained making many ideal sites for the establishment of this plant. It appears that this would be particularly true if some attention were given to seedlings. The yellow poplar is highly intolerant of shade which may present problems to the person attempting to establish this tree, but shade is instrumental in causing the bole to grow tall and clear of limbs. This self pruning of the lower limbs causes much of the lumber of this tree to be clear.

Summary

1. The yellow poplar is one of the most successful of woody plants under conditions of secondary growth in Nicholas County, West Virginia, on moist well-drained soils.

2. It grows most rapidly and reaches its greatest size in rich coves.

3. The success of the plant is the result of a number of factors; its comparative freedom from disease, its rapid growth, and its ability to propagate itself both vegetatively and by seeds.

4. The yellow poplar appears to be an ideal plant for reforestation of abandoned fields in this area on sites where the soil is suited to its growth.

5. This plant is highly intolerant of shade and, therefore, if being cultivated, may need special attention during the early period of its growth.

6. The yield of the yellow poplar in board feet is high, trees of the area under discussion averaging 19.5 inches, DBH, and many being as much as 100 feet tall at 50 years of age.

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FAIRMONT STATE COLLEGE,
FAIRMONT, W. VA.

Checklist of Algae in the Vicinity of Mountain Lake Biological Station — Virginia[1]

HERMAN SILVA FOREST

Mountain Lake Biological Station in Giles County, southwestern Virginia, has been the site of several valuable plant studies, including some on algae.

While no checklist has been compiled up until now, information has been preserved at the station which gives the findings of the phycology classes of 1935 and 1940. Also, a station list of animals for 1936 includes several flagellates. In addition, there are publications on special groups which report identifications from the area: *Phacus* (Meyer, 1940), Oscillatoriaceae (Strickland, 1940), and soil algae (F. B. Smith, 1944). Smith also contributed a station list of other algae collected in 1942.

Generally, "Vicinity of Mt. Lake Biological Station," is the equivalent of Giles County, but a few nearby areas have received some attention and identifications from them are included here for convenience.

In the variety of habitats ranging from limestone valleys to sandstone-capped ridges almost two thousand feet higher are here reported almost four hundred kinds of algae, an impressive total for a county, even if misidentification and duplication are taken into account.

Until the summer of 1953, there was no attempt to preserve any of the collections, but during that period seventy-five labeled packets of algae were assembled to start a small algae section in the Herbarium of Mountain Lake Biological Station. Most of the 165 identifications (including one hundred new for the vicinity) made in 1953 are represented in the preserved specimens.

Among those who have contributed to this list are Miss Lucile Walton, with a set of drawings and identifications made in 1940; Dr. Ivey F. Lewis, with the 1935 class list; Dr. T. K. Ruebush and Dr. B. D. Reynolds, with the 1936 animal list; Dr. S. L. Meyer, Dr. F. B. Smith, and Dr. P. M. Patterson (whose collections are identified with his name). Dr. J. C. Strickland, Jr. has been helpful on several occasions.

In some cases it has been desirable to reinterpret earlier identifications, as is indicated by stating that a name is taken "from" another. In certain cases synonomy is involved; in others, reidentification from

[1]The author's gratitude is due to Dr. L. C. Bird and Phipps and Bird, Inc. for sponsoring, and to the Association of Southeastern Biologists for awarding the fellowship under which this work was completed. Dr. B. D. Reynolds merits special thanks for his aid in many different ways.

drawings. Therefore, the reinterpretations are somewhat conjectural, but are considered to be a worthwhile alternative to silence.

The author's specimen numbers are in the sequence of the University of Tennessee's algae collection.

I. CHLOROPHYTA

1. CHLOROPHYCEAE

1. Volvocales

Polyblepharidaceae

HETEROMASTIX ANGULATA Korsh. barnyard puddle at mansion east of Hoges Store June 24, 1953 No. 2765.

Chlamydomonaceae

CHLAMYDOMONAS COCCIFERA Gorosh. 1936.

CHLAMYDOMONAS INCERTA Pasch. 1936.

CHLAMYDOMONAS NIVALIS Wille 1940.

CHLAMYDOMONAS PSEUDOPERTYI Pasch. (?) 1940.

CHLOROGONIUM spp. 1940; barnyard puddle at mansion east of Hoge's Store June 24, 1953 No. 2765.

FURCILIA spp. New River, pond 1935.

POLYTOMA UVELLA Ehr. 1936.

Volvocaceae

EUDORINA ELEGANS Ehr. Farier's Pond July 24, 1953 No. 2822.

GONIUM FORMOSUM Pasch. 1940.

GONIUM PECTORALE Muell. 1936; pond near Narrows 1940.

PANDORINA MORUM Bory 1936; wayside puddle 1940.

PLEODORINA spp. Shawnee Lake, Little Stony Creek 1935.

VOLVOX AUREUS Ehr. 1936; Mt. Lake 1940.

VOLVOX TERTIUS Meyer 1936.

Haematococcaceae

HAEMATOCOCCUS LACUSTRIS (Girod.) Rostaf. from *Sphaerella lacustris* (Girod.) Wittr. Bald Knob pool 1935; 1940.

STEPHANOSPHAERA PLUVIALIS Cohn pools near top of Bald Knob, 1935; 1936; 1940; 1953.

2. Tetrasporales

Palmellaceae

GLOEOCYSTIS GIGAS (Kuetz.) Lag. Kire swamp July 6, 1953 No. 2785.

GLOEOCYSTIS RUPESTRIS (Lyngb.) Rab. 1940.

PALMELLA spp. Mt. Lake, with *Vaucheria* spp. 1935.

SPHAEROCYSTIS spp. Mt. Lake, on fish bone 1935.

Tetrasporaceae

CHAETOPELTIS spp. in MLBS laboratory 1935.

TETRASPORA GELATINOSA (Vauch.) Desv. mouth of spring, 1940; road side spring near Hotel July 16, 1953 No. 2793.

TETRASPORA LUBRICA (Roth) Ag. stream near Cascades 1940; pools of Mann's Bog July 25, 1953 No. 2826.

Coccomyxaceae

COCCOMYXA spp. rock scraping at Roaring Spring 1935.

OUROCOCCUS spp. Mt. Lake on fish bone 1935.

3. Ulotrichales

Ulotrichaceae

GEMINELLA INTERRUPTA Turp. Kire swamp July 6, 1953 No. 2785.

ULOTHRIX FLACCIDUS Kuetz. from *Stichococcus* spp. on bark above Cascades 1940.

ULOTHRIX RIVULARIS Kuetz. from *Stichococcus fluitans* Gay 1940; Cascades June 26, 1953 No. 2770; July 5, 1953 No. 2783; small stream two miles south of Narrows July 20, 1953 No. 2811.

ULOTHRIX SUBTILIS Kuetz. from *Stichococcus subtilis* (Kuetz.) Klerk. 1940.

ULOTHRIX TENUISSIMA Kuetz. Little Stony Creek above Pembroke July 16, 1953 Nos. 2795 & 2799.

ULOTHRIX ZONATA (Web. & Mohr.) Kuetz. rocks in Sinking Creek June 26, 1953 No. 2771.

Microsporaceae

MICROSPORA STAGNORUM (Kuetz.) Lag. 1940; Kire swamp July 22, 1953 No. 2813; Mt. Lake July 24, 1953 No. 2818.

Cylindrosapsaceae

CYLINDROCAPSA GEMINELLA Wolle (a strange form, which branches and appears to be a true epiphyte) Cascade of Bath Co. July 19, 1953 No. 2802 (Patterson).

Chaetophoraceae

APHANOCHEATE REPENS A. Braun Lake Ranier 1940; Farier's ponds 1953.

CHAETOPHORA spp. 1940.

CHLOROTYLIUM CATARACTUM Kuetz. from *Gongrosira Debaryana* Rab., Sinking Creek 1940; coating rocks in Sinking Creek June 24, 1953 No. 2766, and June 26, 1953 No. 2768; Little Stony Creek above Pembroke July 17, 1953 No. 2796.

DRAPARNALDIA GLOMERATA (Vauch.) Ag. stream below Cascades 1940.

PROTODERMA spp. Mt. Lake on aquatic plants 1953.

STIGEOCLONIUM spp. common in mountain streams and in New River, but an adequate taxonomic study will be necessary before species names can be assigned.

STIGEOCLONIUM TENUE (Ag.) Kuetz. Cascades 1940.

Protococcaceae

PROTOCOCCUS VIRIDIS Ag. 1940; by road near MLBS July 18, 1953 No. 2800.

Coleochaetaceae

CHAETOSPHAERIDIUM spp. Mt. Lake pier 1934.

COLEOCHAETE ORBICULARIS Prings. 1940.

Trentepohliaceae

LEPTOSIRA-like alga 1940.

TRENTEPOHLIA AUREA (L.) Martius limestone builder, Cascades of Bath Co. July 19, 1953 No. 2803 (Patterson).

Sphaeropleaceae

SPHAEROPLEA ANNULINA (Roth) Ag. 1940.

4. Oedogoniales

BULBOCHAETE spp. Mt. Lake 1935; 1940.

OEDOGONIUM spp. 1940.

OEDOCLADIUM spp. West Virginia road near MLBS 1935.

5. Cladophorales

Cladophoraceae

BASICLADIA spp. Craig Creek on turtle 1935.

CLADOPHORA GLOMERATA (L.) Kuetz. probable identity of the *C. crispata* (Roth) Kuetz. listed above for 1940; rocks in Sinking Creek June 24, 1953 No. 2764 & June 24, 1953 No. 2816 & June 26, 1953 No. 2769; Cascades of Bath Co. July 19, 1953 No. 2802 (Patterson).

PITHOPHORA KEWENSIS Wittr. from *P. Cleveana* Wittr. 1940.

RHIZOCLONIUM HIEROGLYPHICUM (Ag.) Kuetz. including report of *R. crassipellitum* West & West 1940; marshy area of Butler Farm June 24, 1953 No. 2768; Sinking Creek June 26, 1953 No. 2771; drain from small pond at Farier's July 16, 1953 No. 2791; New River at Pembroke July 20, 1953 No. 2808.

6. Chlorococcales

Chlorococcaceae

CHLOROCOCCUM HUMICOLUM (Naeg.) Rab. F. B. Smith list and paper of 1942.

TREBOUXIA CLADONIA (Chod.) G. M. Smith 1940.

Micratiniaceae

MICRACTINIUM spp. Hoge's pond plankton 1935.

Dictyosphaeriaceae

DICTYOSPHAERIUM PULCHELLUM Wood Mt. Lake July 24, 1953 No. 2820.

DICTYOSPHAERIUM RENIFORME Bulnh. Mt. Lake 1940.

Characiaceae

CHARACIUM spp. Cascades 1935.

SCHROEDERIA SETIGERA (Schroed.) Lemm. 1940.

Hydrodictyaceae

PEDIASTRUM BORYANUM (Turp). Menegh. including report of *P. Ehrenberger* (?) Hoge's pond 1940.

PEDIASTRUM TETRAS (Ehr.) Ralfs Hoge's pond 1940.

Coelastraceae

COELASTRUM MICROPORUM Naeg. Farier's ponds 1940.

Oocystaceae

ANKISTRODESMUS FALCATUS (Corda) Ralfs 1940; Kire swamp June 30, 1953 No. 2785; July 22, 1953 No. 2813.

CHLORELLA spp. 1935; 1940.

EREMOSPHAERA VIRIDIS DBy. Mt. Lake 1940; Kire swamp July 6, 1953 No. 2785.

GLOEOACTINIUM LIMNETICUM G. M. Smith Mt. Lake 1940.

KIRCHNERIELLA spp. Mt. Lake 1935.

OOCYSTIS BORGEI Snow 1940.

OOCYSTIS ELLIPTICA W. West Kire swamp 1953.

OOCYSTIS LACUSTRIS Chod. 1940.

OOCYSTIS PARVA West & West 1940.

OOCYSTIS RUPESTRIS Kirch. wet rocks, etc., at Pembroke mill July 20, 1953 No. 2810.

PLANKTOSPHAERIA GELATINOSA G. M. Smith Mt. Lake 1940.

QUADRIGULA spp. Mt. Lake plankton 1935.

SELENASTRUM WESTII G. M. Smith from *Ankistrodesmus polymorphum* (?) Hoge's pond 1940.

TETRAEDRON MUTICUM (A. Braun) Hansg. 1940.

TETRAEDRON TRIGONUM (Naeg.) Hansg. Hoge's pond 1940.

TREUBARIA TRIAPPENDICULATA Bernard 1940.

WESTELLA BOTRYOIDES (W. West) DeWild. Hoge's pond 1940.

Scenedesmaceae

ACTINASTRUM GRACILLIMUM G. M. Smith 1940.

ACTINASTRUM HANTZSCHII Lag. Hoge's pond 1940.

CRUCIGENIA spp. Shawnee Lake 1935.

SCENEDESMUS ABUNDANS (Kirch.) Chod. Williams' lower pond at Hoge's Store 1953.

SCENEDESMUS ARMATUS (Chod.) G. M. Smith Hoge's pond 1940.

SCENEDESMUS BIJUGA (Turp.) Lag. Mt. Lake July 24, 1953 No. 2820.

SCENEDESMUS DIMORPHUS (Turp.) Kuetz. 1940; barnyard puddle at mansion east of Hoge's Store June 24, 1953 No. 2765; spring

barrel at Farier's July 16, 1953 No. 2790; artesian spring near Hoge's Store July 16, 1953 No. 2794.

SCENEDESMUS OBLIQUUS (Turp.) Kuetz. 1940; spring barrel at Farier's July 16, 1953 No. 2790.

SCENEDESMUS OPOLIENSIS P. Richt. Williams' lower pond at Hoge's Store 1953.

SCENEDESMUS QUADRICAUDA (Turp.) Bréb. Williams's lower pond at Hoge's Store 1953.

TETRASTRUM ELEGANS Playf. 1940.

7. Zygnemales

Zygnemataceae

SPIROGYRA APLANOSPORA Rhandhawa Farier's ponds July 6, 1953 No. 2798.

SPIROGYRA BELLIS (Hass.) Cleve near Radford 1940.

SPIROGYRA CRASSA Kuetz. Radford 1940.

SPIROGYRA GREVILLEANA (Hass.) Kuetz. 1940.

SPIROGYRA LONGATA (Vauch.) Kuetz. 1940.

SPIROGYRA LUTETIANA Petit 1940.

SPIROGYRA MAJUSCULA Kuetz. near Radford 1940.

SPIROGYRA RIVULARIS (Hass.) Rab. 1940.

SPIROGYRA SETIFORMIS (Roth) Kuetz. Farier's ponds July 6, 1953 No. 2798.

SPIROGYRA VARIANS (Hass.) Kuetz. near Radford 1940; Pembroke mill July 16, 1953 No. 2792.

Mesotaeniaceae

CYLINDROCYSTIS BREBISSONII v. MINOR Cush. wet places in Mann's Bog July 26, 1953 No. 2830.

GONATOZYGON spp. Mt. Lake pier 1935.

MESOTAENIUM MACROCOCCUM (Kuetz.) Roy & Biss. 1940.

NETRIUM DIGITUS (Ehr.) Itz. & Rothe branch near Cascades 1940; Kire swamp July 22, 1953 No. 2814.

NETRIUM INTERRUPTUM (Bréb.) Luetkem. stagnant water 1940.

NETRIUM NAEGELI (Bréb.) West & West Kire swamp July 6, 1953 No. 2785.

SPIROTAENIA CONDENSATA Bréb. broken dam on Cascades road 1940; Mt. Lake July 24, 1953 No. 2818.

Desmidiaceae

ARTHRODESMUS INCUS (Bréb.) Hass. Mt. Lake 1953.

ARTHRODESMUS OCTOCORNIS Ehr. Mt. Lake 1940.

ARTHRODESMUS RALFSII West 1940.

CLOSTERIUM ACEROSUM v. ELONGATUM Bréb. Farier's Pond July 9, 1953 No. 2788.

CLOSTERIUM ANGUSTUM Kuetz. Kire swamp July 6, 1953 No. 2785.

CLOSTERIUM ANGUSTUM v. ELONGATUM Hust. Kire swamp July 22, 1953 No. 2813.

CLOSTERIUM DIDYMOTOCUM Corda. Roadside pool on Cascades road 1940.

CLOSTERIUM LEIBLEINII Kuetz. Kire swamp June 30, 1953 No. 2772; Cranberry bog squeezing July 26, 1953 No. 2828.

CLOSTERIUM LUNULA (Muell.) Ralfs 1940.

CLOSTERIUM MONILIFERUM (Bory) Ehr. Small stream two miles south of Narrows July 20, 1953 No. 2811.

CLOSTERIUM RALFSII. v. HYBRIDUM Rab. Glen Alton pond June 30, 1953 No. 2773; drier flats of Mann's Bog July 25, 1953 No. 2825.

CLOSTERIUM TUMIDUM Johns. Cranberry Bog squeezing July 25, 1953 No. 2828.

COSMARIUM ANGULARE Johns. Kire swamp June 20, 1953 No. 2772; Mt. Lake July 26, 1953 No. 2820.

COSMARIUM CIRCULARE Reinsch. 1940.

COSMARIUM CUCURBITA Bréb. Kire swamp July 6, 1953 No. 2785.

COSMARIUM DENTICULATUM Borge probable intention of the *C. dentatum* listed 1940.

COSMARIUM FURCATOSPERMUM West & West Mt. Lake July 24, 1953 No. 2820.

COSMARIUM IMPRESSULUM Elfv. Farier's ponds July 9, 1953 No. 2788.

COSMARIUM OVALE Ralfs 1940.

COSMARIUM PORTIANUM Arch. Mt. Lake 1953.

COSMARIUM PSEUDOCONNATUM Nordst. Kire swamp July 6, 1953 No. 2785 & July 22, 1953 No. 2813; Mt. Lake July 24, 1953 No. 2820.

COSMARIUM PSEUDOPYRAMIDATUM Lund. Mt. Lake July 24, 1953 No. 2820.

COSMARIUM PUNCTULATUM Bréb. broken dam on Cascades road 1940.

COSMARIUM PYRAMIDATUM v. TRANSITORIUM Heimerl. Kire swamp June 30, 1953 No. 2772.

COSMARIUM QUADRATULUM (Gay) DeToni Kire swamp July 6, 1953 No. 2785; Mt. Lake July 24, 1953 No. 2820.

COSMARIUM QUADRIFARUM near v. HEXASTICHA Nordst. Kire swamp July 6, 1953 No. 2785.

COSMARIUM REGNELII Wille Kire swamp July 6, 1953 No. 2785.

COSMARIUM SEXANGULARE Lund. Kire swamp July 6, 1953 No. 2785; Mt. Lake July 24, 1953 No. 2820.

COSMARIUM SPORTELLA Bréb. MLBS laboratory culture 1953.

COSMARIUM SUBCRENATUM Hantzsch small stream two miles south of Narrows July 20, 1953 No. 2811.

COSMARIUM SUBTUMIDUM Nordst. Farier's ponds July 9, 1953 No. 2788.

COSMOCLADIUM spp. Mt. Lake 1935.

DESMIDIUM spp. Mt. Lake plankton 1935.

DOCIDIUM BACULUM Bréb. from *D. rectum* 1940.

DOCIDIUM UNDULATUM Bail. 1940.

EUASTRUM AFFINE Ralfs 1940.

EUASTRUM ANSATUM Ralfs roadside pool on Cascades Road 1940; Kire swamp July 6, 1953 No. 2785.

EUASTRUM BINALE (Turp.) Ehr. Kire swamp July 6, 1953 No. 2785.

EUASTRUM INSULARE (Wittr.) Roy wet rocks, etc., at Pembroke mill July 20, 1953 No. 2810.

EUASTRUM VALIDUM West & West Kire swamp June 30, 1953 No. 2772.

EUASTRUM VERRUCOSUM Ehr. Mt. Lake 1953.

GONATOZYGON spp. 1940.

HYALOTHECA spp. Kessinger's pond 1935.

HYALOTUECA DISSILIENS (Smith) Bréb. Kire swamp July 22, 1953 No. 2813.

HYALOTHECA MUCOSA (Dillw.) Ehr. 1940.

MICRASTERIAS DENTICULATA Bréb. 1940.

MICRASTERIAS PAPILLIFERA Bréb. Mt. Lake July 24, 1953 No. 2820.

MICRASTERIAS RADIATA v. GRACILLIMA G. M. Smith Mt. Lake 1935.

MICRASTERIAS RADIOSA v. ORNATA f. ELEGANTIOR West & West Kire swamp July 22, 1953 No. 2813.

MICRASTERIAS ROTATA (Grev.) Ralfs Big Mt. saw mill 1940; Kire swamp July 6, 1953 No. 2785 & July 22, 1953 No. 2813; Mt. Lake July 24, 1953 No. 2820.

MICRASTERIAS TRUNCATA (Corda) Bréb. (this collection included one specimen with a semicell fitting the description of v. CRENATUM (Bréb.) Reinsch.) wet places in Mann's Bog. July 25, 1953 No. 2830; Kire swamp July 6, 1953 No. 2785; mosses of Cranberry Bog July 26, 1953 No. 2832.

ONYCHONEMA FILIFORME (Ehr.) Roy & Biss. Mt. Lake 1940.

ONYCHONEMA LAEVE Nordst. 1940.

PENIUM MARGARITACEUM (Ehr.) Bréb. Mt. Lake July 24, 1953 No. 2820.

PLEUROTAENIUM CORONATUM (Bréb.) Ralfs 1940.

PLEUROTAENIUM TRABECULA (Ehr.) Naeg. 1940; Kire swamp June 30, 1953 No. 2772 & July 22, 1953 No. 2813.

SPHAEROZOSMA AUBERTIANUM W. West 1940.

SPHAEROZOSMA EXCAVATA Ralfs 1940.

SPONDYLOSIUM GRANULATUM Roy from *S. papillosum* West & West Mt. Lake 1940; Mt. Lake 1953.

SPONDYLOSIUM PLANUM (Wolle) West & West Kire swamp June 30, 1953 No. 2772.

SPONDYLOSIUM PYGMAEUM (Cooke) W. West Mt. Lake 1940.

STAURASTRUM ALTERNANS Bréb. Cranberry Bog sqeezing July 26, 1953 No. 2828.

STAURASTRUM APICULATUM Bréb. Kire swamp June 30, 1953 No. 2772.

STAURASTRUM ARCTISCON (Ehr.) Lund. Mt. Lake 1940; Glen Alton pond 1953.

STAURASTRUM CURVATUM W. West 1940

STAURASTRUM DILATATUM Ehr. Kire swamp June 30, 1953 No. 2772 & July 6, 1953 No. 2785.

STAURASTRUM HEXACERUM (Ehr.) Wittr. Farier's ponds July 9, 1953 No. 2788 .

STAURASTRUM OPHIURA Lund. Glen Alton pond July 24, 1053 No. 2821.

STAURASTRUM ORBICULARE Ralfs small stream two miles south of Narrows July 29, 1953 No. 2811; Mt. Lake July 24, 1953 No. 2820.

STAURASTRUM ORBICULARE V. HIBERNICUM W. West Glen Alton pond 1953.

STAURASTRUM PACHYRHYNCHUM Nordst. Glen Alton pond July 30, 1953 No. 2773.

STAURASTRUM POLYMORPHUM Bréb. Kire swamp July 6, 1953 No. 2785 & July 22, 1953 No. 2813; Mt. Lake July 24, 1953 No. 2820.

STAURASTRUM PYRAMIDATUM W. West roadside ditch near MLBS 1953.

STAURASTRUM QUEBECENSE Irénée-Marie Farier's ponds July 9, 1953 No. 2788.

STAURASTRUM SUBSCABRUM Nordst. Kire swimp July 22, 1953 No. 2813.

TETMEMORUS BREBISSONII (Menegh.) Ralfs wet places in Mann's Bog July 25, 1953 No. 2830; mosses of Cranberry Bog July 26, 1953 No. 2832.

XANTHIDIUM spp. Mt. Lake bottom sample 1935.

2. CHAROPHYCEAE

1. Charales

Characeae

CHARA VULGARIS L. Farier's ponds 1940 & 1950, apparently perennial here.

NITELLA FLEXILIS Ag. Mt. Lake 1953, and undoubtedly perennial here.

II. EUGLENOPHYTA

1. EUGLENOPHYCEAE

1. Euglenales

Euglenaceae

CRYPTOGLENA PIGRA Ehr. 1936.

EUGLENA ACUS Ehr. noted as "colorless" 1936; 1940; Kire swamp 1953.
EUGLENA AGILIS Carter from *E. pisciformis* Klebs 1940.
EUGLENA CAUDATA Hueb. 1936.
EUGLENA DESES Ehr. 1936.
EUGELNA GRACILIS Klebs 1936.
EUGLENA MUTABILIS Schmitz mud by Pembroke mill July 20, 1953 No. 2804.
EUGLENA OXYURIS Schmarda 1936.
EUGLENA PROXIMA Dang. 1936.
EUGLENA SANGUINEA Ehr. 1940.
EUGLENA SIMULACRA Walton 1936.
EUGLENA SPIROGYRA Ehr. 1936; 1940.
EUGLENA SPIROIDES Lemm. 1936.
EUGLENA SPLENDENS Dang. Kire swamp July 6, 1953 No. 2785.
EUGLENA THINOPHILA Skuja pond east of Pearisburg 1953.
EUGLENA TORTA Stokes 1936.
EUGLENA TRIPTERIS (Duj.) Klebs 1936.
EUGLENA VARIABILIS Klebs 1936.
EUGLENA VIRIDIS Ehr. 1940; Kire swamp 1953.
EUTREPTIA VIRIDIS Perty 1936.
LEPOCINCLIS OVUM (Ehr.) Lemm.
LEPOCINCLIS TERES (Schmitz) Franzé 1936.
LEPOCINCLIS TEXTA (Duj.) Lemm. 1938?
PHACUS CAUDATUS Hueb. 1936; 1936-8? (Meyer).
PHACUS HELIKOIDES Poch. Farier's ponds July 24, 1953 No. 2822.
PHACUS LONGICAUDUS Hueb. 1936 (Meyer); 1940.
PHACUS ORBICULARIS Hueb. pond east of Pearisburg 1953.
PHACUS PLEURONECTES (O.F.M.) Duj. 1936 (Meyer); Kire swamp July 6, 1953 No. 2785.
PHACUS PYRUM (Ehr.) Stein 1936 (Meyer).
PHACUS TRIQUETER (Ehr.) Duj. 1936 (Meyer); near Narrows 1940.
TRACHELOMONAS ACUMINATA (Schmarda) Stein 1936; 1940.
TRACHELOMONAS ARMATA (Ehr. Stein ponds near Pembroke 1940.
TRACHELOMONAS CAUDATA (Ehr.) Stein ponds near Pembroke 1940.
TRACHELOMONAS CYLINDRICA Ehr. ponds near Pembroke 1940.
TRACHELOMONAS HISPIDA (Perty) Stein 1936; Kire swamp July 22, 1953 No. 2813.
TRACHELOMONAS HISPIDA V. CRENULATOCOLLIS (Maskall) Skvor. pond a mile south of Hoge's Store 1953.
TRACHELOMONAS HISPIDA V. PUNCTATA Lemm. Kire swamp July 6, 1953 No. 2785.
TRACHELOMONAS OBLONGA Lemm. 1936.

Trachelomonas obtusa Palmer 1936.
Trachelomonas Palmeri (Drez.) Defl. ponds near Pembroke 1940 roadside ditch near MLBS 1953.
Trachelomonas perforata (Auersw.) Defl. 1938?
Trachelomonas piscitoria (Fisher) Stokes 1940.
Trachelomonas urceolata Stokes 1936.
Trachelomonas volgensis Lemm. 1940.
Trachelomonas volvocina Ehr. 1936.

Astasiaceae

Astasia spp. 1936.
Distigma proteus (O.F.M.) Ehr. 1936.
Menoidium incurvum (Fres.) Klebs 1936.

Peranemaceae

Anisonema acinus Duj. 1936.
Anisonema emarginata Stokes 1936.
Euglenopsis vorax Klebs 1936.
Heteronema acus (Ehr.) Stein 1936.
Notosolenus sinuatus Stokes 1936.
Petalomonas spp. Sinking Creek mill pond 1935.
Petalomonas abscissa (Duj.) Stein 1936.
Peranema trichophorum (Ehr.) Stein 1940; Mt. Lake July 24, 1953 No. 2820; Glen Alton pond July 24, 1953 No. 2821.

III. CHRYSOPHYTA

1. Xanthophyceae

1. Heterocapsales

Chlorosaccaceae

Chlorosaccus spp. Mt. Lake plankton 1935.

2. Heterococcales

Characiopsidaceae

Characiopsis Naegelii Lemm. 1940.

Chlorotheciaceae

Ophiocytium cochleare (Eichw.) A. Braun Kire swamp July 22, 1953 No. 2813.

3. Heterotrichales

Tribonemataceae

Tribonema bombycinum Derb. & Sol. 1940; roadside spring near Hotel June 26, 1953 No. 2777 & July 16, 1953 No. 2793.
Tribonema minus G. S. West 1940; small stream at Glen Alton June 30, 1953 No. 2774.

4. Heterosiphonales

Botrydiaceae

Botrydium granulatum Grev. White Pine Lodge 1940.

Vaucheriaceae

Vaucheria sessilis DeC. roadside pool above Pembroke July 5, 1953 No. 2784.

2. Chrysophyceae

1. Chrysomonadales

Syncryptaceae

Syncrypta volvox Ehr. 1936.

Synuraceae

Synura uvella Ehr. 1936; branch on West Virginia road 1940. The *S. adamsii* G. M. Smith listed is not supported by the drawing present.

Ochromonadaceae

Dinobryon sertularia Ehr. 1936.

3. Bacillariophyceae

1. Centrales

Coscinodiscaceae

Cymbella spp. 1940.

Cyclotella operculata (Ag.) Kuetz. Mt. Lake 1940.

Stephanodiscus Hantzschii Grun. Glen Alton pond 1953.

2. Pennales

Meridionaceae

Meridion circulare (Grev.) Ag. puddle near Pembroke 1940.

Diatomaceae

Odontidium spp. from *Diatoma* spp. Mt. Lake with *Vaucheria* spp. 1935.

Achnanthaceae

Achnanthes spp. 1940.

Gomphonema spp. Kessinger's pond plankton 1935; 1940.

Naviculaceae

Pinnularia spp. 1940.

Navicula spp. 1940.

Stauroneis spp. 1940.

Surirellaceae

Surirella spp. Kessinger's pond 1935.

Surirella linearis v. helvetica (Brun.) Meister Glen Alton pond 1953.

IV. PYRRHOPHYTA

1. Cryptophyceae

1. Cryptomonadales

Cryptochrysidaceae

Cryptochrysis spp. Kire swamp June 30, 1953 No. 2772.

Cryptochrysidaceae

Cyathomonas truncata Ehr. 1936.

2. Dinophyceae

1. Gymnodiniales

Gymnodiniaceae

Gymnodinium fuscum Drez. 1936.

2. Peridinales

Glenodiniaceae

Glenodinium neglectum (Schill.) Lind. 1936.

Glenodinium quadridens (Stein.) Schill. Glen Alton pond July 24, 1953 No. 2821.

Hemidinum nasutum Stein 1936; Mt. Lake 1940 & July 24, 1953 No. 2820.

Gonyaulaceae

Gonyaulax palustre Lemm. Farier's ponds July 9, 1953 No. 2788.

Peridiniaceae

Peridinium gatunense Nygaard Kire swamp July 22, 1953 No. 2813 & No. 2814; Farier's pond July 24, 1953.

Ceratiaceae

Ceratium hirundinella (O.F.M.) Schrank 1940; Farier's ponds July 9, 1953 No. 2788.

3. Dinocapsales

Gloeodiniaceae

Urococcus insignis (Hass.) Kuetz. 1940.

V. CYANOPHYTA

1. Myxophyceae

1. Chroococcales

Chroococcaceae

Anacystis dimidiata (Kuetz.) Drou. & Dail. from *Chroococcus turgidus* (Kuetz.) Naeg. Cascades 1942 (F. B. Smith list); besides Cascades July 12, 1953 No. 2787.

Anacystis montana (Lightf.) Drou & Dail. from reports of *Gloeocapsa magma* (Bréb.) Kuetz., *G. polydermatica* Kuetz., and *G. muralis* Kuetz. Bear Cliff 1935 and class list (no location) 1940; beside Cascades July 12, 1953 No. 2787.

ANACYSTIS NIDULANS (Richt.) Drou & Dail. from *Microcystis pulverea* (Wood) Migula Cascades 1940.

COCCOCHLORIS STAGNINA Spreng. from *Aphanothece stagnina* (Spreng.) A. Braun Mt. Lake 1940; concrete spring mask near Newport June 26, 1953 No. 2776; wet rocks, etc., at Pembroke mill July 20, 1953 No. 2810.

GLAUCOCYSTIS spp. Shawnee Lake 1935.

GOMPHOSPHAERIA spp. including *Coelosphaerium* spp. Mt. Lake 1935.

MERISMOPEDIA THERMALIS Kuetz. from *M. glaucum* (Ehr.) Naeg. and *M. elegans* A. Braun 1940.

MERISMOPEDIA TRANQUILLA (Ehr.) Trev. Glen Alpine pond July 24, 1953 No. 2821; Kire swamp July 6, 1953 No. 2785 & July 22, 1953 No. 2813; Glen Alton pond July 24, 1953 No. 2821.

2. Chamaesiphonales

Chamaesiphonaceae

ENTOPHYSALIS spp. (possibly *E. Brebissonii* (Menegh.) Drou. & Dail.) from *Chamaesiphon* spp. epiphytic on *Oedogonium* spp. in Cascades 1935.

3. Hormogonales

Oscillatoriaceae

ARTHROSPIRA JENNERI Gom. 1940; Farier's ponds July 9, 1953 No. 2786 & July 24, 1953 No. 2822.

LYNGBYA AESTUARI (Mert.) Lieb. 1940.

LYNGBYA DIGUETII Gom. boat bottom at Kessinger's pond 1938 (Strickland).

LYNGBYA EPIPHYTICA Kuetz. on *Ulothrix* spp. in Cascades July 5, 1953 No. 2783.

LYNGBYA NANA Tild. 1940.

LYNGBYA PUTEALIS Mont. 1940; Kire swamp July 22, 1953 No. 2814.

MICROCOLEUS LACUSTRIS (Rab.) Farl. Cascades 1939 (Strickland); 1940.

MICROCOLEUS PALUDOSUS (Kuetz.) Gom. wet mud of deer pool near MLBS June 23, 1953 No. 2762.

MICROCOLEUS VAGINATUS (Vauch.) Gom. five terrestrial sites 1938-9 (Strickland); 1940.

OSCILLATORIA AGARDHII Gom. Mt. Lake 1940.

OSCILLATORIA ANGUINA Gom. in road above Pembroke July 5, 1953 No. 2780.

OSCILLATORIA CHLORINA Gom. 1940; edge of Farier's ponds July 24, 1953 No. 2822.

OSCILLATORIA FORMOSA Gom. Farier's ponds July 24, 1953 No. 2822.

OSCILLATORIA GEMINATA Menegh. 1940.

OSCILLATORIA LIMOSA Kuetz. spring 1939 (Strickland); 1940.

OSCILLATORIAA PRINCEPS Gom. New River 1939 (Strickland); wet mud at Pembroke Mill July 20, 1953 No. 2805.

OSCILLATORIA SPLENDIDA Grev. 1940; Kire swamp July 6, 1953 No. 2785.

OSCILLATORIA TENUIS Gom. Cranberry Sphagnum Bog 1938 (Strickland); concrete drain from Farier's ponds July 9, 1953 No. 2786; mud by Pembroke mill July 20, 1953 No. 2804; pond east of Pearisburg July 20, 1953 No. 2806; culvert at road junction 700 & 460 June 24, 1953 No. 2824.

OSCILLATORIA TENUIS V. NATENS Gom. Willow Spring at Newport July 24, 1953 No. 2822 & 2823.

PHORMIDIUM AUTUMNALE (Ag.) Gom. two puddles 1938 (Strickland); mud puddle in road below Cascades July 5, 1953 No. 2782; artesian spring near Hoge's Store July 16, 1953 No. 2788 & No. 2794.

PHORMIDIUM CORIUM (Ag.) Gom. 1940.

PHORMIDIUM FAVOSUM Gom. on rocks in New River at Pembroke July 20, 1953 No. 2807.

PHORMIDIUM INUNDATUM Kuetz. 1940.

PHORMIDIUM PAPYRACEUM (Ag.) Gom. Cascades 1939 (Strickland).

PHORMIDIUM RETZII Gom. three aquatic collections 1938-9 (Strickland); concrete spring box at Butler's Farm June 24, 1953 No. 2767.

PHORMIDIUM SUBFUSCUM (Ag.) Kuetz. stream by Sinking Creek, and in Cascades 1938 (Strickland).

PHORMIDIUM TENUE (Menegh.) Gom. three aquatic collections 1938-9 (Strickland); Kire swamp July 6, 1953 No. 2785.

PHORMIDIUM UNCINATUM (Ag.) Gom. three collections 1938-9 (Strickland); Mt. Lake edge 1940; coating rocks in stream at Pembroke July 17, 1953 No. 2797.

PLECTONEMA NOSTOCORUM Born. concrete spring mask near Newport June 26, 1953 No. 2776; spring barrel at Farier's July 16, 1953 No. 2790.

PLECTONEMA TOMASINIANUM (Kuetz.) Born. Cascades June 26, 1953 No. 2770.

SCHIZOTHRIX spp. West Virginia road near MLBS 1935.

SCHIZOTHRIX ARENARIA (Berk.) Gom. Butt Mt. road 1939 (Strickland).

SCHIZOTHRIX CALCICOLA (Ag.) Gom. Cascades 1939 (Strickland), and July 12, 1953 No. 2787.

SCHIZOTHRIX FRIESII (Ag.) Gom. twenty collections mostly from soil 1938-9 (Strickland).

SCHIZOTHRIX HYALINA Kuetz. 1940.

SCHIZOTHRIX MUELLERI Naeg. edge of pond near Kire, and among wet grasses on Butt Mt. road 1938 (Strickland); 1940.

SCHIZOTHRIX PENCILLATA (Kuetz.) Gom. Cascades road 1939 (Strickland).

SCHIZOTHRIX PURPURESCENS Gom. drier flats of Mann's Bog July 25, 1953 No. 2825.

SPIRULINA MAJOR Kuetz. 1940; culvert at road junction 700 & 460 June 24, 1953 No. 2824.

SYMPLOCA MURALIS Gom. three terrestrial sites 1939 (Strickland); on rock below Cascades July 5, 1953 No. 2782; drier parts of Mann's Bog July 25, 1953 No. 2829.

SYMPLOCA MUSCORUM Gom. six terrestrial sites 1939 (Strickland); pool on Cascades road 1940, and *Lyngbya aeruginea-caerulea* (Kuetz.) Gom. 1940.

Nostocaceae

ANABAENA INAEQUALIS (Kuetz.) Born. & Flah. 1940.

APHANIZOMENON FLOS-AQUAE (L.) Ralfs Glen Alton pond July 24, 1953 No. 2821.

CYLINDROSPERMUM CATENATUM Ralfs wet bank by Mt. Lake June 23, 1953 No. 2761 .

CYLINDROSPERMUM MAJUS Kuetz. wet peat moss of Man's Bog July 25, 1953; No. 2827; soil by Farier's pond drain July 27, 1953 No. 2831.

CYLINDROSPERMUM MINIMUM G. S. West 1940.

CYLINDROSPERMUM MINUTISSIMUM Col. 1940.

CYLINDROSPERMUM MUSICOLA Kuetz. ground back of laboratory MLBS.

CYLINDROSPERMUM STAGNALE (Kuetz.) Born. & Flah. 1940.

NOSTOC CAERULEUM Lyngb. 1940.

NOSTOC MUSCORUM Born. & Flah. on soil of bank at old homestead above Pembroke July 5, 1953 No. 2779.

NOSTOC SPHAERICUM Vauch. Cascades 1942 (F. B. Smith list).

NOSTOC VERRUCOSUM Born. & Flah. wet rocks in stream above Kire June 30, 1953 No. 2775.

Scytonemataceae

FREMYELLA TENERA (Thur.) DeToni Kire swamp July 22, 1953 No. 2813.

HALLASIA spp. Mud Branch 1935.

SCYTONEMA ALATUM (Carm.) Borzi from *S. densum* (A. Braun) Mig. Cascades 1940.

SCYTONEMA HOFMANNII Ag. from *S. cinereum* Crouan 1940.

SCYTONEMA INTERTEXUM (Kuetz.) Rab. Kire swamp 1953.

SCYTONEMA MIRABILE (Dillw.) Born. sticks in Mt. Lake 1940.

SCYTONEMA MYOCHROUS (Dillw.) Ag. Cascades July 12, 1953 No. 2787; rocks near Cascades of Bath Co. July 19, 1953 No. 2802 (Patterson).

TOLYPOTHRIX PENCILLATA (Ag.) Thur. drying rocks at Cascades 1940.

Stigonemataceae

FISCHERELLA AMBIGUA (Naeg.) Gom. drier flats of Mann's Bog July 25, 1953 No. 2825.

HAPALOSIPHON ARBOREUS West & West sticks in Mt. Lake 1940.

HAPALOSIPHON HIBERNICUS West & West 1940.

STIGONEMA MINUTUM (Ag.) Hass. Cascades 1940.

STIGONEMA MAMILLOSUM (Lyngb.) Ag. 1940.

STIGONEMA OCELLATUM (Dillw.) Ag. Cascades July 12, 1953 No. 2787.

STIGONEMA TURFACEUM Cooke 1940.

Rivulariaceae

CALOTHRIX PARIETINA (Naeg.) Thur. swimming pool 1940; Kire swamp July 22, 1953 No. 2814.

DICHOTHRIX ORSINIANA (Kuetz.) Born. & Flah. from *D. olivacea* (Hooker) Born & Flah. swimming pool 1940.

GLOETRICHIA spp. Shawnee Lake 1935.

RIVULARIA BECCARIANA (DeNot.) Born. & Flah. from *R. compactum* (Ag.) Born. & Flah. sticks in Mt. Lake 1940.

SACCONEMA spp. submerged twig in Mt. Lake 1935.

VI. RHODOPHYTA

1. RHODOPHYCEAE

1. Bangiales

Phorphyridiaceae

PHORPHYRIDUM CRUENTUM Naeg. Old Sweet Spring 1940.

Batrachospermaceae

BATRACHOSPERMUM ECTOCARPUM Sirodot Willow Spring at Newport July 24, 1953 No. 2819.

Lemaneaceae

LEMANEA PLEOCARPA (Atk.) Silva Sinking Creek near Taylor's Cave June 26, 1963 No. 2864 .

SACHERIA FUCINA (Bory) Sirodot from *Lemanea fucina* Bory 1940; Cascades July 5, 1953 No. 2863; Little Stony Creek above Pembroke July 16, 1953 No. 2869.

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NOTES and NEWS

FORAY INTO THE SOUTH BRANCH VALLEY OF WEST VIRGINIA, APRIL 23-4, 1954—Following the annual meeting of the West Virginia Academy of Science in Philippi, W. Va., on April 23, 1954, a pilgrimage was made to the botanical collecting grounds of the late Dr. Hamilton McSparrin Gamble, physician and amateur botanist of Moorefield The group met at Moorefield High School on the evening of the 23rd to hear an interesting biography of Dr. Gamble, ably presented by Mr. Robert W. Gamble, grand nephew of Dr. Gamble and Clerk of the Circuit Court of Hardy County. Dr. Earl L. Core of West Virginia University presented some equally interesting comments on the botanical life of Dr. Gamble and displayed an herbarium specimen of the Christmas Rose (Helleborus viridis), a species that Dr. Gamble had sent to Asa Gray many years ago. The 6th ed. of Gray's Manual lists this species for West Virginia as a result of Dr. Gamble's work. Professor Core also announced that a section of the West Virginia University Arboretum had been named Gamble Garden to honor this great personality. Mr. William Leeson, Director of the Arboretum, gave an illustrated kodachrome lecture on the plant life of the area, including some of the endemic species found on the classic shale barrens of the region. Refreshments were served by the Farm Womens Club of Moorefield and each guest was given a boutonniere of Bird Foot Violets (*Viola pedata*), a common species in the South Branch Valley.

The next morning the party assembled at the high school, and under the guidance of Mr. Wilbert Frye, of Pleasant Dale, traveled through the area known as Dry Trough of the South Branch where many interesting plants were observed, including Shooting Star (*Dodocatheon meadia*), Wild Pink (*Silene pensylvanica*), and Wild Phlox (*Phlox subulata*). Following lunch in Romney, the group proceeded north to Hanging Rock and Springfield, where one of the outstanding shale barrens was observed. Notable species seen here included *Talinum teretifolium* and *Paronychia virginica*.

Among those making the pilgrimage were Arno E. Friddle, Moorefield, W.Va.; Mary G. Van Meter, Washington, D.C.; Mrs. W. L. Wilson, Moorefield, W.Va.; Mrs. Robert M. Gamble, Moorefield, W.Va.; David Gamble, Moorefield, W.Va.; Pattie H. Chrisman, Moorefield, W.Va.; Lena Artz, Waterlick, Virginia; Wilbert M. Frye,

Pleasant Dale, W.Va.; Helene M. Walker, Winchester, Virginia; Margaret M. Gilman, Washington, D.C., Mr. and Mrs. D. S. Collins, Petersburg, W.Va. Robert E. Gall, Morgantown, W.Va.; L. Wayne Wilson, Moorefield, W.Va.; Earl L. Core, Morgantown, W.Va.; R. D. Cole, Towson, Maryland; Elmer G. Worthley, Owens Mills, Maryland; Mrs. A. C. McNeill, Moorefield, W.Va.; Mrs. R. H. Savile, Moorefield, W.Va.; Mrs. C. L. Friddle, Moorefield, W. Va.; Mr. and Mrs. H. A. Davis, Morgantown; William Leeson, Morgantown, W.Va.; Ellen Z. Vandervort, Morgantown, W.Va.; and Mrs. Gotha Brand, Morgantown, W. Va.—William Leeson, West Virginia University.

Kodachrome Exchange—The Southern Appalachian Botanical Club announces the initiation of a new service to their members and to other interested parties. The present goal is the assemblage and dissemination of a series of 2 × 2 Kodachrome transparencies illustrating the typical plant communities of the United States. We are limiting the number of slides from each state to twenty. This number may be increased or the coverage broadened in the future depending upon the response to the present offering. This exchange will be kept on a non-profit basis. Each set of twenty slides will cost about $7 including mailing.

It is our opinion that a superior set of Kodachromes can be assembled through the cooperation of botanists in each state. If each participating individual selects from his and his associates' originals the most typical and reproducible transparencies of the vegetation in his locale the resulting collection should surpass any series available on the market today. The further advantage of having complete annotations concerning communities, species, and habitats prepared by trained botanists rather than photographers should make the slides ideal for instructional aid in plant geography and ecology.

To expedite the collection of a usable series of slides the exchange will be limited at first to contributing participants. The transparencies will be viewed by our staff for quality and general acceptability before they are incorporated into the system. Realizing the value placed by the owner on his originals we plan to accept only duplicates. After a reasonable sample of slides from the various plant formations has been assembled the series will be made available for educational purposes to non-contributors.

Further information and application blanks may be obtained by writing to Charles H. Baer, Department of Biology, West Virginia University, Morgantown, West Viirginia.

BOOK REVIEW

Woody Plants of the Southwestern Deserts*

Easterners planning a vacation trip through the fascinating deserts of the southwest will find this new book well worth including in their luggage. A good part of the scenery of the deserts is represented by the bizarre plants found in those regions and the present work provides an excellent semi-popular (as well as scientific) treatment of the subject. Only the cacti are omitted in this description of southwestern woody plants, and these were included in a previous work, *The Cacti of Arizona*, written by the senior author and issued by the same publishers. The present book thus is regarded as the second in a series. Over 250 species are treated in considerable detail.

Forty-four pages of introductory material include a lengthy account of the desert vegetation, a section on medicinal importance of plants, discussions of the structure of flowers, fruits, stems, and leaves, and various other subjects of general interest.

The identification of most of the woody plants of the region is rendered very simple by the technique used by the authors. The more common and conspicuous plants are represented by excellent photographs showing the general habit of the species. These are included in 34 plates, 9 of them in color, and in many cases show the aspects of the plants that would be noted from the tourist's automobile. Some of the same species, and many others, are shown in lin drawings executed by Lucretia Breazeale Hamilton and indicate features that would be apparent upon closer examination. Almost every genus, and all important species, are illustrated.

In addition to the sight identification through consultation of the illustrations, the botanist will find keys for recognition of families, genera, and species. Each species is discussed at length. Matters of general interest, such as the geographical distribution of the plants and their importance to man and other animals, appear in larger type so as to be given greater prominence. More detailed botanical descriptions are given in smaller type.

The geographical region covered extends roughly from El Paso, Texas, to Palm Springs, California, including the creosote-bush deserts

*The Trees and Shrubs of the Southwestern Deserts. Lyman Benson and Robert A. Darrow. 437 p. 83 figs. 34 pl. University of Arizona Press and University of New Mexico Press. $8.50. 1954.

and the desert grasslands of extreme western Texas and the southern portions of New Mexico, Arizona, and California. Small distributional maps show by green shading the ranges of most of the more important species of plants.

One feature of the book that will appeal to the ordinary tourist is the liberal use of English, Spanish, and Indian popular names for the plants. Since most of the trees and major shrubs are conspicuous, they have been given vernacular names and the authors use them when they are available. Identification is thus rendered easier, because of the possibility of checking with local residents on common names. Adoption of "synthetic alleged common names" has been avoided by the authors.

While this review has stressed the value of the book to the tourist driving across the desert (as this reviewer has done), the work is also of importance to professional botanists because of the important scientific information which it contains. This information is included not only in the data given in the specific accounts, but also in the appendix, where there appears bibliographic material of much value. In alphabetic arrangement the appendix gives the genera treated in the book, with each species of the area, references to place and date of publication, the type locality and name of the collector, as well as principal synonyms and their place of publication.

Finally, it is good to know that the authors, including such a wealth of scientific and semi-popular information, have made it easily available through an exhaustive index which lists vernacular and scientific names in one alphabetic sequence.

The book is pleasing in appearance, well-bound, and has easily read type. Typographical errors are very few.

Trees and Shrubs of the Southwestern Deserts constitutes a most valuable addition to our steadily increasing library of "floras". Botanizing in the southwest will be much easier hereafter, as a result of the painstaking work of the two authors, both of whom have a long acquaintance with the plants of the area.—Earl L. Core, West Virginia University.

Reprints should be ordered when galley proof is returned to the editor. Morgantown Printing & Binding Co., Morgantown, W. Va., have furnished the following rates:

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